
XIII. A Description of Five British Species of *Orobanche*. By the Rev.
Charles Sutton, B.D. A.L.S. late Fellow of St. John's College,
Cambridge.

Read December 5, 1797.

FROM the desire of exciting a more accurate investigation and description than has hitherto been made of the several species of *Orobanche*, both British and Foreign, I transmit to the Society a description of those which are found in the county of Norfolk: I shall premise only a short observation or two upon their general habit and manner of growth.

The first thing that is apt to strike us with respect to these plants, is, that they are *Parasitic*; but they are not altogether so, like the several species of *Epidendrum*, *Viscum*, &c. They acquire sustenance and stability not only from the foster-plants to which they are attached, but also, and that in no small degree, from the soil, into which they send forth radical fibres.

All the species exhibit an ungraceful formality from the defect of leaves, and have their surface more or less beset with minute pellucid glanduliferous hairs, which project perpendicularly from the stems, squamæ, bractæ, calyces, corollæ, and are sometimes found within the flowers, upon the very stamina and pistilla: these, according to the remarks of Guettard, have each an articulation at the

the distance of about two-thirds from their base, and are tipped with a globular sort of cup, bearing a viscid gland: we may suppose them to be intended to carry off secretions, and to answer the purposes of leaves in performing the office of respiration, &c. It is to the volatility of these secretions that we are to attribute the difficulty of preserving living specimens for any length of time, and the harsh ungracious appearance they assume in an herbarium.

They emit no smell (I speak of those only which I am about to describe), have an acrid astringent taste, and are rejected by all kinds of animals, except the minuter tribes of *Cimices* and *Thripes*.

They are acotyledons; for, when a seed has attached itself to the root of any living plant, to which it is suited by its nature to adhere, it swells into a pellucid squamose gem or bulb; and after throwing out around the point of adhesion several tender fibres, it pushes up at once into a perfect plant, without any lateral lobes or cotyledons; developing first the squamæ and then the stalk, with a capitulum of flowers concealed by bractæ, in form resembling a young head of asparagus: the flowers afterwards expand in succession upwards, and the capitulum becomes a spike. See Tab. xvii. fig. 1 and 2.—Adanson has classed this genus among his monocotyledons.

Notwithstanding what has been said of the banefulness of the *Orobanche*, that it destroys the plants which feed it, I have had no experience of the fact: to me it has ever seemed to

“. Grow with their growth, and strengthen with their strength.”

Dr. William Turner, one of our earliest and most judicious herbalists, has given us the following account of it: he calls it Choke-weed, and says, “It is called about Morpeth in Northumberland (the place of his nativity) Newe Chappel Flower, because it

grewe in a chappel there, in a certaine place called Bottell-bankes, whereas the unlearned people dyd worshyppe the image of St. Marye, and reckoned that the herbe grewe in that place by the vertue of that image.—Besides it that Dioscorides wryteth, I have marked myselfe that this herbe growethe muche abouthe the rootes of broome, y^e whych it clasbeth abouthe with certaine lyttel rootes on everye side lyke a dogge holdyng a bone in his mouth: notwithstanding I have not seen any broome choked with this herbe, howbeit I have seen the herbe called three-leved grasse or claver utterly strangled, al the natural juice clene drawne oute by thys herbe."

It is not improbable that more than one species is included in this account, for which reason I have given the extract, and that the "Choke-weed" of the clover may be different from the "Choke-weed" of the broom, and that the "Newe Chappel Flower" distinct from both, may be a species not yet defined. Be this so or not, it will at least be worth while to make further researches, and investigate what may yet remain; in particular to make enquiry after that which Mr. Curtis speaks of, on the information of Mr. Thomas White, as growing upon walls in Pembrokeshire and the decayed floor of an old castle; for none of those with which we are at present acquainted are found in such situations.

* *Corollis Quadrifidis.*

i. *OROBANCHE major.*

Caule simplicissimo. Corollis quadrifidis, inflatis. Staminibus inferne nudis. Stigmate bilobo, lobis distantibus. Stylo supernè pubescente.

O. major, caule simplicissimo pubescente, staminibus subexsertis.
Curtis Fl. Lond. fasc. 4. tab. 44.

O. major,

O. major, Withering Bot. Arr. 3d edit. p. 557.

O. major, stem simple, corolla inflated; its upper lip undivided; lower in three equal segments. Stamina smooth. Style downy. Smith in Engl. Bot. tab. 421.

Radix crassa, carnosa, interdùm bulbosa, perennis, parasitica; radici lignosæ spartii scoparii, et ulicis uropæi imprimis adhærens; radiculis simplicibus, fragilissimis instructa; plures emittens caules. *Caulis* simplicissimus erectus, carnosus, angulatus, pilosus*, craf-sitie digitæ, altitudine pedali et ultra, ex luteo fuscus, dilutè purpurascens, squamis lanceolatis sparsis, sub solo confertioribus. *Flores* spicati, pilosi, fusi, interdùm purpurascentes, stigmatibus flavis; persistentes rigidi, sordidè-ferruginei. *Bra&etæ* simplices, lanceolatae, pilosæ, floribus interdùm longiores. *Calyx*, perianthium subæquale, pilosum, diphylleum, laterale foliolis profundè bifidis, laciniis acutis inæqualibus.—Variat perianthio monophyllo quadrifido a parte posteriori usque ad basin partito. *Corolla* tubulosa, quadrifida, pilosa, tubo sursum inflato, incurvo, dorso subcarinato; faux valde aperta; limbus bilabiatus obsoletè denticulatus; labium superius fornicatum, obtusum, integrum, parùm reflexum; inferius trilobum, lobis ferè æqualibus, acutis, planiusculis, intermedia dependente. *Nectarium*, glandulæ + tres anticæ germini insertæ. *Stamina*, filamenta quatuor subulata, supernè pilosa, infernè omnino nuda, canaliculata plana, duó breviora lateribus, duo longiora anticæ parti tubi inserta, decurrentia, apice recurva; antheræ didymæ, altro apice mucronatæ, ad-

* Si quas plantarum partes in his descriptionibus uno verbo *pilosas* vel *pilosusculas* dixeris, pilos glanduliferos intelligat lector.

† Sic Curtis, & sic amicus noster accuratissimus D. Rob. B. Francis:—Ipse autem nullum offendit.

hærentes,

hærentes,—defloratæ unâ cum stylo exsertæ. *Pijillum*, germen oblongum, nitidum, pilosiusculum; stylus filiformis, pilosiusculus, apice pubescens, purpurascens; stigma bilobum, lobis globosis, flavis, distantibus, medio transversè rimosum. *Pericarpium*, capsula ovato-oblonga, longitudinaliter dehiscens, unilocularis bivalvis; *Semina* minuta, numerosa, subturbinata, reticulato-cellulosa. *Receptacula*, quatuor linearia lateralia, adnata.

Floret Junio. 4.

Habitat in dumetis sterilioribus, et in locis incultis—Thorp, Brook, Baconsthorp.

As this species has generally passed for *O. major*, and has been figured and described as such by the authors of the *Flora Londinensis* and *English Botany*, I have retained that trivial name, though it is now suspected not to be that of Linnæus, nor the *O. major Garyophyllum olens*, so often mentioned, of C. Bauhin. Of the many synonyms to *O. major*, quoted by Reichard in his edition of the *Systema Plantarum* of 1780, vol. 3. p. 183, it is extremely difficult which to refer to our plant: we may safely however exclude those from Bauhin *Pin.* 87.—Loefling, p. 151, original edition,—and Pollich, No. 600. Dr. Withering, in his 3d edition of the *Bot. Arrangement*, has judiciously excluded the long description of Loefling. I dare not quote any of his synonyms, for want of sufficient marks of discrimination: the figures he refers to in Morrison xii. 16. I. Gerard em. p. 1311, Clusius i. p. 270, Dodonæus p. 552, and Lobel *Ic.* ii. 89, are copies of each other, and, if meant for our plant, are very bad representations of it. J. Bauhin's ii. p. 780, is equally uncertain; that of Matthiolus p. 536, copied in Gerard's *Herbal*, 1st edition, p. 1130, and that of *Tabernæmontanus*, p. 684, though not satisfactory, are a great deal better.

VOL. IV.

A a

2. ORO.

2. OROBANCHE elatior: Tab. 17.

Caule simplicissimo. Corollis quadrifidis. Staminibus infernè pilosis. Stigmate obcordato. Stylo supernè glabro.

Radix præcedentis, radici lignosæ *Centaureæ Scabiosæ* et *Trifolii pratensis* imprimis adhærens. *Caulis* præcedentis, sed procerior. *Flores* longè spicati, pilosi, pallidè rubescentes, venis saturationibus notati; stigmatibus flavis; persistentes, rigidi, subcompressi, ferruginei—centum et plures in eâdem spicâ interdum numeravi. *Braeæ* præcedentis. *Calyx*, perianthium abbreviatum, pilosum, monophyllum, quadrifidum, ponè usque ad basin partitum, laciniis lanceolatis, acuminatis, duabus posterioribus divaricatis, longiusculis; leviter striatum, folidè album, lineis dilutè rubris notatum. *Corolla* tubulosa, quadrifida, pilosa; tubo cylindraceo recurvo; dorso carinato; faux aperta; limbus bilabiatus, inæqualis, fimbriato-crispus; labium superiùs rotundatum, reflexum, integrum; inferiùs trilobum; lobis æqualibus, rotundatis. *Nectarium*, glandulæ quatuor nectariferæ ad basin filamentorum, tubo insertæ. *Stamina*, filaments quatuor subulata, anticè glabra, nuda, posticè ad basin pilosa, pilis non glanduliferis, duo breviora lateribus, duo longiora anteriori tubi parti inserta. *Antheræ* didymæ, altero apice mucronatæ, leviter adhærentes; defloratæ unâ cum stylo exsertæ. *Pistillum*, germen ovatum, glabrum, nudum; stylus glaber, nudus; stigma bilobum, obcordatum, flavum, medio transversè rimosum. *Pericarpium*, capsula ut congenerum. *Semina* rugosa, seu obsoletè reticulata.

Floret Julio, Augusto 4.

Habitat in agris *Trifolii pratensis*, non in fementis anno; et in marginibus

ginibus agrorum juxta Centaureas scabiosam et nigram, Scabiosam arvensem, &c.—Gunton, Kelling, Sheringham, Catton, Costesey, in glareosis.

This is no uncommon plant: it has hitherto been constantly confounded with the preceding; but though they are similar in general appearance, the difference between them is very discernible on a closer inspection; and they who acknowledge the force of that sentiment of Linnæus, that “minimis partibus per totum naturæ campum certitudo omnis innititur, quas qui fugit pariter naturam fugit*,” will be ready to allow this to be a distinct species. There is reason to suppose it may have been noticed by Ray very early, though not particularly distinguished by him; for in his *Historia Plantarum circa Cantabrigiam nascentium*, printed in 1660, his first work in Botany, he speaks of having found the *O. florum majore* of J. B. “in a field of barley, on the right hand of the way between Cambridge and Grantchester, also in a corn-field at Cherryhinton,” places in which this is very likely to be found, as it grows among herbaceous plants, and never on the roots of broom or furze:—He adds, “also at Gamlingay, growing at the roots of broom plentifully:” here he undoubtedly means our *O. major*, for that is still to be found there in abundance. In his *Catalogus Plantarum Angliae*, published ten years afterwards, he notices them thus: “ad radices genistæ, interdum et inter segetes.”

3. OROBANCHE minor.

Caule simplicissimo. Corollis quadrifidis. Staminibus inferne pilosis. Stigmate retuso. Stylo superne glabro.

* *Philosophia Botanica*, p. 222. under the 280th aphorism: Fructificationis partes saepius constantissimas differentias subministrant.

- O. major, caule simplici, bracteis lanceolatis, flore majoribus.
Loefl. Plantæ Hispanicæ rariores, No. 35.
- O. major β. minoribus floribus albidis, spicâ densiore. *Haller Stirp. Helv.* I edit. p. 610.
- O. flore minore, *R. Syn.* 3 edit. p. 288.*
- O. major β *Huds. Flo. Engl.* I edit. p. 232 ?
- O. ramosa β *Huds. Flo. Engl.* 2 edit. p. 266 ?
- O. minor. Stem simple. Corolla tubular; its upper lip undivided; lower in three curled segments, of which the middle one is lobed. Stamina ciliated. Style smooth.—*Smith in Engl. Bot.* tab. 422.

Radix priorum, squamis rarioibus; radici lignosæ *Trifolii pratensis* imprimis adhærens. *Caulis* 6—12 pollicaris, simplicissimus, erectus, teretusculus, pilosus, crassitie ferè pennæ anserinæ, incarnatus, interdum luteus, squamosus, squamis rarioibus—caules plurimi interdum aggregati. *Flores* spicati, luteo-albidi, venis purpureis notati, pilosi—variant colore luteo;—persistentes, rigidi, ferruginei;—flos inferior sèpè pedunculatus. *Bracteæ* simplices, lanceolatæ, pilosæ, ferè longitudine florum. *Calyx*, perianthium subæquale, cauli concolor, pilosum, diphylum, laterale, foliolis nunc bifidis; laciniis angustissimis inæqualibus; nunc simplicibus lanceolatis, integris, vel uno latere incisis. *Corolla* tubulosa, quadrifida, pilosa; tubo cylindraceo, patente, incurvo; dorso carinato; faux aperta; limbus bilabiatus, inæqualis; labium superius rotundatum, crenulatum, integrum; inferius trifidum, laciniis æqualibus, rotundatis crenulatis—variat intermediâ interdum trilobatâ. *Nectarium*, glandulæ quatuor crocatae nectariferæ ad basin filamentorum. *Stamina*, filamenta quatuor subulata, anticè glabra, nuda, posticè pilosa, pilis non glanduliferis, duo breviora lateribus, duo longiora anteriori tubi parti inserta.

Antheræ

Antheræ didymæ, altero apice mucronatæ—defloratæ unâ cum stylo exsertæ. *Pistillum*, germen ovato-oblongum, nudum; stylus filiformis, subnudus; stigma retusum, margine dilatatum, purpureum, medio transversè rimosum, aliquando monstrosum evadit triangulare vel quadratum. *Pericarpium*, capsula ut conges- nerum. *Semina rugosa*, vel obsoletè reticulata..

Dignoscitur prima facie—a præcedente, calyce diphyllo variabili;
—a majore, corollâ cylindracea;
—ab utrâque, corollâ minore.

Floret Julio, Augusto, 4 vel 5.

Habitat in agris ad radices *Trifoliū pratense*, non in fementis anno;
et in pascuis inter *Hypochærin radicatam*, &c.—Sheringham,
Weyborn, Eaton, Frettenham.

Having been favoured by the President with a sight of the plants in the Linnæan herbarium, it was with great pleasure I found there one of this species: it was inscribed by Linnaeus, *Orobanche major*, and was given him by Loefling; most probably it was one of those from the King of Spain's garden at Aranjuez, found at the roots of elms, which Loefling has described among his *Plantæ Hispanicæ rariores*. That it forms a distinct species there can now be very little doubt: the figure in *English Botany* is taken from one of my specimens—it represents the calyx perfectly well, but not the stigmata. It is frequently to be found with a much longer spike; in which case the flowers are not only more numerous, but are much closer set than in the figure. From its growing so very copiously among clover, I am of opinion it is the same which Dr. Turner noticed as being so pernicious to it. None of the other old Herbalists have mentioned it, nor has it been introduced into any of our British Floras, if we except Hudson, who is thought to have it in his

first

first edition of *Flo. Angl.*; but, from his uncertainty respecting it afterwards, it should seem he took it upon trust from Dillenius, rather than from any knowledge he himself had of it: Dillenius, in his edition of *Ray's Synopsis*, speaks of its being found in a field of oats near Rochester. It might possibly be not unknown to Ray. I am at least inclined to think so, from a passage in his *Historia Plantarum*, vol. ii. p. 1227, where having described the *O. majore flore J. B.* he adds, “*O. flore minore J. B. adeo parum differt a præcedente ut specie diversum esse mihi persuadere vix possum.*”

* * *Corollis quinquefida.*

4. *OROBANCHE cœrulea.*

Caule subsimplici. Corollis quinquefida. Bracteis ternis. Calycibus tubulatis, semiquadrifidis.

O. lœvis, caule simplicissimo, lœvi, staminibus exsertis. *Syst. Plant.* ed. *Reichard.* vol. iii. p. 183.

O. purpurascens, caule simplicissimo pubescente staminibus inclusis. *Syst. Nat. ed. Gmelin*, p. 954.

O. purpurea, caule simplicissimo pubescente staminibus inclusis. *Jacquin Flo. Aust. tab. 276.*—*Ibid. enum. Vindob. Obs. 50.*

O. caule simplici, stipulis ternatis, calyce quinquefido. *Haller Stirp. Helv. 2 edit.* No. 294.

O. floribus cœruleis laxè spicatis. *Gmelin Flo. Sib.* vol. iii. p. 215. tab. 46. fig. 1.

O. cœrulea, caule simplici, basi bulboso, floribus numerosis incurvis. *Villars Dauph.* vol. ii. p. 406.

O. ramosa β. *Withering Bot. Arr. 3 edit.* p. 558.

O. cœrulea. Stem simple. Corolla tubular; its upper lip cloven and notched, lower in three equal entire segments. Stamina smooth. Bracteæ three. *Smith in Engl. Bot. tab. 423.*

Radix

Radix ut congenerum; radiculis diversarum herbarum radices complectentibus. *Caulis* 6—10 pollicaris, subsimplex, erectus, rigidus, pilosiusculus, parum flexuosus, angulatus, sublignosus, ex luteo olivaceus, crassitie penitus anserinæ vel cygneæ, squamosus, squamis ovato-lanceolatis. *Flores* laxè spicati (spicâ obtusiusculâ), violacei, venis saturationibus notati, leviter pilosi, floribus ramoæ affines sed majores; persistentes torti, compressi, cernui, fusciflos inferior sèpè pedunculatus. *Braœtae* ternæ calyci vix æquales, duæ laterales interiores lineari-lanceolatæ, internæ media exterior ovato-lanceolata, pilosæ, pilis brevibus. *Calyx*, perianthium monophyllum, cauli concolor, tubulatum, semiquadrifidum, laciniis æqualibus lanceolatis, acuminatis, pilosis, cum rudimento quintæ ad incisuram profundiorem posticam; interdum, sed raro, adest quinquefidum cum rudimento sextæ posticæ. *Corolla* ringens quinquefida, pilosa; calycé duplo longior, tubo infernè tereti, supernè sensim ampliato, compresso-triangulari; dorso acutè carinato, medio obtusiusculè incurvo; faux dehiscens; limbus bilabiatus subæqualis; labium superius bifidum, laciniis obtusiusculis, reflexis denticulatis, venis majoribus in dentes eductis; inferius trilobatum, laciniis æqualibus acutiusculis; palatum sericeum, pilis scilicet albis, non glanduliferis, adpressis, tectum. *Nectarium* frustra quæsivi. *Stamina*, filamenta quatuor filiformia, nuda, glabra, vix recurva, duo breviora lateribus, duo longiora anteriori tubi parti inserta. *Antheræ* luteo-albidæ, conniventes intra faucem—defloratae inclusæ. *Pistillum*, germen ovato-oblongum, nudum, lœve; stylus filiformis, incurvus, pilosiusculus; stigma capitatum, album, bilobatum, nec rimosum, faucem claudens. *Pericarpium*, capsula ovato-oblonga, medio sulcata, longitudinaliter dehiscens. *Semina* minuta numerosa, subturbanata, reticulato-cellulosa.

Floret Julio 4.

Habitat

Habitat inter gramina, in pascuis, et ad margines agrorum—
Sheringham juxta mare, Beeston, et Northrepps.

We are entered now upon a division of the genus in which the species, besides having the upper lip of the corolla divided, differ in many respects from those in the last: the shape of the flower is no longer cylindrical; the stamens are short and filiform, the stigma with no apparent transverse fissure, the calyx tubular, the bractæ ternate, and the plants altogether less succulent and perhaps less parasitic. The character therefore being in general so different, and more obvious marks of discrimination presenting themselves in this division, I presume a small deviation from the form of the specific definitions before laid down may be allowed.

The stem in this species, though generally, is not always unbranched; the Rev. R. B. Francis of Holt has remarked to me, that, if mutilated, it will throw out lateral shoots; and I have observed, that this is not the case with any of the three foregoing species; for if the entire spike of any of them is broken off, even at an early period, the stem decays; and if great part of it only is broken off, the work of nature is carried on in perfecting the few flowers that remain, on elongated footstalks.—From this circumstance, and from having also seen a perfect specimen that was branched towards the bottom, I have been induced to define this species *Caule subsimplici*.

The little that was known of it in England, till lately, was from Mr. Pitchford's specimen found in 1779, and Mr. Lightfoot's (see *With. Bot. Arr.* p. 558, and *Engl. Bot.* p. 184.) Being most allied to the *ramosa*, it was taken at first for a variety of it, and described as such in Withering, though with a very incorrect reference to its *habitat*. In 1796 Mr. Scrimshire found several at Sheringham, and I found
a few

a few at the adjoining parish of Beeston, one of which I presented to the Society in February last. It seems to have been more generally found abroad, where it has usually passed for that unknown species of Linnæus, the *O. levis*; a mistake arising, as I have been convinced by the President, from a wrong application of synonyms in the *Species Plantarum*.—See the preceding paper.

5. OROBANCHE ramosa.

Caule ramoso. Corollis quinquefidis. Bracteis ternis. Calycibus brevibus, profundè quadrifidis.

- O. *ramosa*, caule ramoso, corollis quinquefidis.—*Syst. Plant. ed. Reichard*, p. 184.—*Pollich Flo. Pal.* n. 601.
- O. caule ramoso, flore quinquepartito.—*Haller*, 2 edit. n. 296.
- O. *ramosa*, caule subramoso, corollis quinquefidis.—*Hudson Flo. Ang.* 2 edit. p. 266.
- O. *ramosa*.—*Raii Syn.* 3 edit. p. 288.*—*With. Bot. Arr.* 3 edit. p. 558.
- O. *ramosa*, stem generally branched, corolla with five segments.—*Smith in Engl. Bot. tab.* 184.

Radix congenerum, annua, vix squamosa, Cannabis sativæ radicibus cauleque imprimis implicita. Caulis 6—10 pollicaris, erectus, subflexuosus, teres, pilosus, sublignosus, luteo-purpurascens, crassitie ferè pennæ anserinæ, basi ramosus, ramis caule brevioribus, squamosus, squamis raris ovato-lanceolatis, citò fuscescentibus; interdum simplex. Flores spicati (spica acuta) ex albido cœrulei; venis cœruleis notati; pilosi; persistentes declinati, tubo superne compresso, inferne ventricosiore, fusti—flos inferior sæpe pedunculatus. Bracteæ ternæ breves, calyci vix æquales, membranaceæ, citò fuscescentes, duæ laterales interiores, lanceolatæ acuminatæ,

minatæ, exterior ovato-lanceolata. *Calyx*, perianthium monophyllicum, hyalinum, dimidio corollæ brevior, scilicet ad corollæ longitudinem in ratione 2 ad 5; latius et profundius ad posticam quam ad anticam partem, ibique quam ad latera, incisum; lacinias æqualibus, lanceolatis, acutis. *Corolla* ringens, quinquefida, pilosa, tubo infernè terete, supernè sensim ampliato, compresso-triangulari; dorso carinato incurvo; faux dehiscens; limbus bilabiatus inæqualis; labium superius rotundatum, breviusculum, bifidum edentatum, reflexum; inferius trilobum, lacinias æqualibus, rotundatis, porrectis. Palatum ex albido luteum, pilis albidis non glanduliferis barbatum. *Nectarium* nullum. *Stamina*, filamenta præcedentis, pilosiuscula, purpurascens. *Antheræ* luteo-albidæ, intra faucem tectæ,—defloratæ inclusæ. *Pistillum*, germen quadrato-ovatum nitidum, pilosiusculum; *Stylus* filiformis, incurvus, pilosiusculus, purpurascens; *Stigma* retusum, margine dilatatum, albidum, non rimosum. *Pericarpium*, capsula quadrato-ovata, longitudinaliter dehiscens. *Semina* minuta numerosa, subturbinate, reticulato-cellulosa.

Floret Augusto, Septembri ♂.

Dignoscitur a præcedente — Spicis acutis; caule et ramis parùm squamosis; calycibus bracteisque dimidio corollæ brevioribus; tubo post florescentiam infernè globoſo.

This species was first found in Norfolk, by Mr. Woodward, in the year 1785, in a hemp field at Brome. He found it again, some time afterwards, in a similar situation, on the opposite side of the river at Mettingham, near Beccles, in Suffolk—the place where it is reported to have been found, in the time of Dillenius, by Dr. James Sherard. It grows also among the hemp at Outwell, in Norfolk. The seeds of both were probably introduced into England together.

In





Orobanche elatior.